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Concerto for Life

Music is everywhere – in the sound of the wind rustling the leaves, the trickle of a stream, the rush of waves on the beach, the patter of rain on the roof, the warble of a magpie, the coo of a baby and especially in the songs of childhood and the magic of sharing a child's delight in them. Over the course of the past two days we have explored an array of options, which together create a holistic approach to ensure the health and well being of developing minds and bodies. I see each of these strategies working in concert as integral parts of the orchestra but for the purpose of this presentation, I have chosen the power of music as the focal point for the **concerto**. However, without the orchestra the performance loses its impact.

When we talk about the *cadence, pitch, lilt and rhythm* of language we are intuitively acknowledging the inextricable link between language and music. An increasing body of evidence supports the notion that the systems the brain uses to process music are fundamentally entwined with those used in perception, memory and language. Receptive language, the essential precursor to expressive language, is dependent on the brain's ability to process sound efficiently.

Sound plays an integral role in the way we experience the world and the clinical research of French physician, Dr Alfred Tomatis, confirmed the importance of listening in our lives and its far-reaching impact on learning and language. He identified the relationship between listening and speech, language, positive social interaction, motivation to learn, attention and concentration as well as musical ability. Language allows predictability in our world. It gives us the ability to assess what others are thinking and thus facilitates effective communication and learning.

Children today live in an environment of TOXIC noise (*Alex Doman; National Academy for Child Development*). They are increasingly exposed to acoustic pollution from birth (and before) emanating from a range of digital and electronic sources, traffic noise, lawnmowers, air conditioners and fans, rock music from the stereo and the blare of a TV. Even the sound

of children's toys can range up to 100dB. This cacophony has deleterious effects on nervous systems and well-being.

Because receptive language is dependent on the brain's ability to process sound efficiently, children who are exposed to a chronically noisy environment have difficulty acquiring speech recognition skills and this manifests itself in the increasing number of children requiring clinical intervention. We know also that the incidence of learning difficulties such as ADHD and autism is increasing and can only conclude that these must be lifestyle disorders. Consider the implications for the child who is hypersensitive to sound, has a short attention span and who is constantly attempting to filter out these extraneous environmental sounds

The Reticular Activating System (RAS), located deep within the brain stem, monitors all incoming stimuli and decides what should be attended to and what should be dismissed as irrelevant. To survive, many children learn to tune out at a very early age and by the time they arrive at kindergarten or pre-primary they are already expert in the art of tuning out and the teacher's voice is right up there amongst the sounds that are systematically dismissed. As a result the child's formal education is impeded before it has begun.

By creating a more harmonious soundscape in which children can take refuge, we can make a positive contribution to their development in ways that are as profound as they are varied:

- Stimulating movement and the heart rate of a baby in-utero
- Stimulating brain growth in the womb and throughout early childhood
- Positively affecting emotional perceptions and attitudes from pre-birth onward
- Providing patterns of sound which can facilitate understanding of the physical world
- Reducing emotional stress and physical pain.
- Enhancing motor development and spatial awareness so that crawling, walking, skipping and running are mastered with ease and grace
- Enhancing speech and language development
- Providing the building blocks for receptive and expressive language – comprehension, and communication

- Providing the building blocks for higher order thinking, problem solving, mathematics and science
- Providing the tools for creative and emotional expression and awareness of aesthetic beauty
- Laying the foundations for successful social development
- Aiding in the development of a sense of identity and self-concept.

Music, like laughter, releases endorphins, the 'feel good' hormones developed by the brain to enhance our physiological and emotional states. Stress hormones have a toxic effect on the developing brain and chronic stress can lead to a break down in the body's immune system. In his paper "The Musical Hormone" Norman Weinberger of the University of California refers to the evident interplay between music, hormones and the brain so why not use the simple power of music to help reduce stress – our own and that of the children entrusted to our care. A calm and relaxed mother or carer is reflected in the body chemistry of the child. Gaia Grant captures this paradigm in her book "Calm Mother, Calm Child".

Music is the language of emotions, featuring in ritual and celebration, heralding the milestones in our lives and instilling a sense of unity amongst tribe members and communities. It opens a gate to world history and is a window to the soul of past civilisations. I am sure we have all experienced the exhilaration of spontaneously bursting into song when we hear a familiar tune, of being moved by the haunting sounds of the Last Post or the stirring cadences of a National Anthem at a ceremonial event.

Culturally and historically, examples abound of the place of music in the nurturing of young children and the emergence of the lullaby with its lilting $\frac{3}{4}$ time is no accident. Obviously parents centuries ago intuitively came to realise the effectiveness of the gentle singing and rocking motion in slowing a baby's natural rhythms, synchronising them with the simple rhythms and melodies of the songs and thereby inducing relaxation and sleep. The heartbeat, breathing rates, motor movements and brain patterns of parent and child gradually synchronise in the phenomenon known as entrainment. There is no more tender harmony or profound form of communication than this, for the intimacy of this contact activates the limbic, or emotional, centres of the brain of infant and adult alike. John Bowlby's pioneering work on

attachment determined that such nurturing experiences affect the structure of the brain and create the physiological and psychological blueprint for future relationships. In essence the child's emotional security hinges on this crucial factor.

Research has shown that babies at birth and in utero are universally receptive to music. Brain development begins within the first month after conception and generates in the vicinity of 250,000 neurons per minute. At birth the neurons are poised to develop neural networks through the formation of synapses – fluid-filled gaps across which electrochemical messages are transmitted and received. Neurons are differentiated to assume specialised roles and every new sensory experience causes the relevant neurons to fire, establishing synaptic connections with each other. This activation of neural synapses, known as wiring, is a direct result of sensory stimulus. The richer the stimuli, the greater the number of neural connections and the more effective will be the learning that takes place.

A neuron may interact with thousands of other cells forming a complex labyrinth of pathways that map the way an individual thinks, reasons and remembers. Consolidation of these synaptic connections results from frequent exposure to the stimuli, while those synapses not in use atrophy over time. This process of neural pruning enables those in use to function more efficiently and through this 'use it or lose it' principle the architecture of the brain is shaped. So the significance of the child's earliest sensory experiences cannot be over-emphasised.

In the developing human brain there are critical windows of opportunity for 'hard wiring' or the development of neural pathways to occur. These critical windows, or periods of development, when neural pathways are particularly receptive to stimuli occur very early in the child's development. For speech and language acquisition the critical window has been identified as birth to three years, while for emotional development the critical time is birth to eighteen months. But the significance of pre-natal stimulus is also becoming widely acknowledged.

The auditory nerve, which transmits information from the ear to the brain, is the first sensory nerve of the body to become functional. By the final trimester of pregnancy the auditory system is mature enough to enable the brain to process sound and becomes the baby's

earliest communication with the outside world. For the remainder of the gestation period much of the sensory input the baby receives is via the ears. Along with the visual and motor systems, the auditory system is essential to cognitive development so what is heard will irrevocably impact on the way the brain is wired. Evidence increasingly shows that music plays a crucial role in this process.

Immersion in the complex, repetitive structures of music increases the brain's opportunity to develop organised, harmonious patterns, which predispose it to optimum social, emotional and cognitive development. It is increasingly recognised that immersion in music can literally affect the architecture of the developing brain.

While still in-utero the baby is able to perceive the cadences and musicality of speech as well as the melodic contours and rhythmic structures of music. She will become increasingly adept at differentiating pitch in music, voices and random sounds. This ability to distinguish pitch is the first step in phonological awareness, an essential pre-requisite for language acquisition and literacy development. Some fundamental commonalities exist between music and speech; the explanation for this being the proximity within the brain of the areas controlling each.

Speech development is controlled by Broca's area, located in the frontal lobe of the left hemisphere, just in front of the motor cortex responsible for speech muscles. Language, or the understanding and processing of speech, is controlled by Wernicke's area, located partially in the temporal lobe and partially in the parietal lobe of the left hemisphere. Music processing, however, is centred in the right hemisphere in an area approximately matching that of Broca's area. Significantly, this region of the brain is also associated with higher cognitive functions, such as spatial ability.

One of my observations as a primary music specialist has been that a young child's inability to respond positively to music is an accurate predictor of lower academic achievement. The corollary of this is that musically capable students will invariably be academically capable also. Children exposed to appropriate musical experiences will usually demonstrate more sophisticated aural discrimination skills for perceiving language and better skills in articulation

and expressive language. These advanced skills in language and communication lay the foundations for self-confidence, self-esteem, positive social interaction and cognitive development, yet all too frequently I hear parents dismiss these rich sources of sensory stimulation as not being “real” learning. .

Improved listening helps facilitate better integration and organisation in the sensory and motor systems. As the brain learns to process sound efficiently improvements occur in auditory processing, receptive language and communication skills. Given the connection between the ear and balance, it should come as no surprise that improvements in motor skills are also evident.

Music is a whole body experience so adding the dimension of rhythmic movement – bouncing, clapping, rocking, tapping – or dramatic action enriches the experience by simultaneously firing neurons in the music, movement, language and emotion areas of the brain.

In the formative years movement is critical for learning. Through it, the child is able to reinforce emerging concepts, as it is another aspect of the multi-sensory approach that establishes neural pathways. Movement is a fundamental part of the holistic approach that enhances the ability to concentrate, devise a plan, focus on the task and explore alternative solutions. It promotes active rather than passive participation and helps in the development of motor co-ordination and spatial awareness –the child’s sense of her place in relation to her surroundings – a pre-requisite for successful participation in physical pursuits such as dance or sport. It also helps reinforce the language components of syntax and semantics.

Cognitive psychologist, Howard Gardner of Harvard University, challenges the traditional notion of intelligence through his theory that our conscious brain functions through multiple forms of intelligence. Included in these are musical and bodily-kinaesthetic intelligences along with verbal-linguistic, mathematical-logical, visual, interpersonal, intrapersonal and naturalist. The child who is a bodily-kinaesthetic learner needs to reinforce all her learning through physical movement or manipulation of objects. She learns through the concrete rather than the abstract. This may be the child who needs opportunities to physically walk

through the process of retelling a story or to manipulate cards with words on them to construct sentences. Early exposure to rhythmic movement will enhance the learning possibilities for such children.

However, Gardner considers music as a **biological imperative**, claiming that the musical intelligence “carries more emotional, spiritual and cultural weight than any of the other intelligences”.

Debate continues as to what music is most beneficial. In his work on sound therapy, Tomatis coined the term *the Mozart Effect*, acknowledging the highly complex structure of Mozart’s music as being helpful in stimulating neural pathways and connections to facilitate a more orderly approach to problem solving and reasoning tasks.

Georgio Lazanov from the University of Sophia used the slow and calming andante, adagio and largo movements from the Baroque composers in developing his brain-music resonance technique for learning. This is based on the premise that the bass continuo at one beat per second calms the body, while the melody produces a state of alert receptiveness for learning.

Significant as these sophisticated musical genres are, it is also important to consider the timeless impact of nursery songs, rhymes and chants, through which very young children absorb the lilt and cadence of language. They not only enrich the baby, they strengthen the maternal bond and forge links in communication. These experiences lay the foundations for mastery over the complexities of language and are significant in developing a sense of timing in the young child’s brain. This is the foundation for balance, spatial awareness, coordination, self confidence and self esteem. Given that our universe, our very being is controlled by rhythms from the primordial rhythms of the universe to the biological rhythms of life, the need to enhance this innate sense of timing cannot be overstated. **And it is never too early to begin.**

Active participation in a music program instils in children a range of life skills that carry over into all aspects of their daily interactions. They learn about the discipline of daily practice, commitment to rehearsals, being part of a team and experiencing the deep sense of accomplishment that goes with a successful performance. They learn to strive to do better

and to understand that their contribution to the ensemble is vital. They learn about attention to detail - a single wrong note, or even a right note played at the wrong time, can ruin weeks or months of preparation by the entire group. They learn to problem solve, take risks and believe in themselves. They learn that life does not always offer instant gratification; that achievement is the culmination of dedication, commitment and effort. These are the cornerstones to resilience - the coping mechanisms to bounce back from disappointment and to overcome adversity. This, I believe, is the single greatest gift we can give our children.

Through active involvement in music, children can also become more expressive as they respond emotionally to the music they play. In his paper, *Feel the Music*, (MuSICA Research Notes, Vol VIII. Issue 2 Spring 2001) Norman Weinberger reports on a study undertaken by Patrick Juslin at Uppsala University in Sweden, the findings of which suggest that this heightened sensitivity translates into a capacity to intuitively read the moods of others and empathise accordingly.

In his book, "Music with the Brain in Mind", Eric Jensen denotes an entire section to the correlation between music and emotional intelligence, a theory that highlights the interplay between emotion and cognition. Jensen cites Dr Frank Wilson, neurologist at the University of California as claiming that learning to play a musical instrument 'connects, develops and refines the entire neurological and motor brain systems'. We know that the most effective learning occurs within an emotional context and there is a growing acknowledgement that emotional intelligence and the positive relationships it can generate may be more important to our success than cognition.

Effective emotional intelligence encapsulates the capacity to:

- ❖ Identify and label feelings
- ❖ Express such feelings appropriately
- ❖ Understand and manage feelings
- ❖ Control impulses and gratification
- ❖ Differentiate between emotions and actions
- ❖ Reduce stress

Through music, children connect with their feelings and come to understand and delight in the world around them so it is critical that we cultivate in them an affiliation for music. By systematically exposing them to the wonder of music from the earliest possible opportunity their brains will become programmed to respond positively to those earliest experiences for the rest of their lives and their appreciation for music will remain an intrinsic part of their psyche. While they may, and indeed should, explore a range of musical genres, it is important for them to know and understand that the prevailing youth culture is not the only culture and indeed is often minimalist and transitory.

As an interesting footnote in a study undertaken in 1994 Took and Weiss identified in adolescents, a strong correlation between listening to heavy metal and rap and lower academic achievement, early sexual activity, arrests and drug usage. It may be, however, that because of poor self-image and other associated factors, adolescents predisposed to inappropriate behaviours simply gravitate to minimalist musical genres.

I do not wish to propose a simplistic solution to a complex problem. Immersion in music is one factor that will contribute to a child's health and well-being. It needs to be coupled with immersion in language and literature, adequate nutrition, security and above all unconditional love. It is but one element of the symphony.

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